



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/646,858	08/22/2003	Steven Lowen	04843-043001	1524
26161 7590 07/30/2007 FISH & RICHARDSON PC P.O. BOX 1022 MINNEAPOLIS, MN 55440-1022				
			EXAMINER LAMPRECHT, JOEL	
			ART UNIT 3737	PAPER NUMBER
			MAIL DATE 07/30/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/646,858

Applicant(s)

LOWEN ET AL.

Examiner

Joel M. Lamprecht

Art Unit

3737

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 June 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3-14,17-25 and 27-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-14,17-25 and 27-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/4/07 has been entered.

### ***Response to Arguments***

Applicants arguments filed with the request for continued examination have been entered and fully considered. The Examiner notes in the 103(a) rejection that Evans does not disclose a combination of a system with a scanning protocol, rather pointing out that the use of optical markers and a combined coordinate system allows data to be processed to account for movement of a patient. The Examiner would like to direct Applicant's attention to paragraphs 36 and 37 of their specification where the desired mode of updating slice prescriptions is described. Optical position information is taken, and z-coil or x/y-coils are used to update the slice prescriptions using standard trigonometric methods. Applicant's arguments with regard to Cosman are that there is no updating of a scanning protocol (slice prescriptions) of a magnetic resonance system to account for patient motion. The Examiner disagrees with this assertion once again. Cosman discloses that initial data including scanning protocols, slice data, position coordinates and other such information is taken (Col 5 Line 24-36). Cosman then in

column 11 Lines 4-35 describes the analogous use of a LINAC device substituted with those of a CT, MRI, or other such system. Finally in column 5 Line 35-54, the positions of the index markers is then used to determine slice and scanning data for the imaging system employed which would be a dynamic calculation for each of the index-marked positions.

Examiner suggests that Applicant provide additional definition of the independent claims by appending; "updating of slice prescriptions *during image collection* to reflect updated position information before the next waveform is generated within the MRI scanning protocol". The addition of this information would help to further define over the rejection of record, and provide additional distinction of Applicant's invention over inventions of the same nature as those of Cosman; keeping in mind that the Cosman system has the capacity to store multiple sets of slice prescription data which are able to be recalled (and therefore "dynamically updated") based on optical position information.

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 1, 4, 5, 9-14, 17-19, 21-23, and 25, 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Evans et al (US 6858003) in view of Cosman (US 6662036).

Evans discloses a system including an optical system including two cameras (figure 2B, elements 38a and 38b), which are located outside of the body of a patient to provide motion tracking of a site (Col. 22, line 27). In one embodiment, passive elements are used to detect 3D motion of the site, which may be markers or IR reflectors (Col. 32, lines 40-46), so that light may be detected. A processor allows for data to be processed compensating for movement of the subject (figure 6, elements 552 and 554) wherein processor may be a computer (figure 4) and the system additionally includes a display (figure 6, element 556) and memory (figure 40A-I, element 1868). Evans, however, fails to disclose combination of the system with a scanning protocol.

Cosman also discloses a system for position or motion tracking wherein the positioning system uses two cameras for tracking including integrated sources of radiation in the form of LEDs in which the camera detects light reflected from four markers (Col. 7, lines 33-45 and figure 2). Cosman explicitly discloses a variety of markers and reflectors, such as reflecting spheres, and it would be an obvious modification to use mirrors as the reflective surface disclosed by Cosman (Col. 4, lines 5-26). The system determines the position of the patient's body with respect to a treatment or imaging machine (abstract), such as an x-ray machine for diagnostic imaging, but may also be a CT, MRI, simulator, PET, or other imaging machine used in an analogous manner (Col. 11, lines 4-7). Motion may also be tracked when the patient is moved in a variety of ways, including translation in multiple directions, as shown in figure 5, and rotation, as shown in figure 1. The system may be used on any part of a patient's body, however it is explicitly shown that markers are put on both the head and

chest of the patient (figures 5 and 11). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Evans in light of the reference by Cosman, as Cosman states it is advantageous to correlate scan data with camera data to enable desired positioning as well as an effective graphics display (Col. 2, lines 11-15).

3. Claims 3 and 24 rejected under 35 U.S.C. 103(a) as being unpatentable over Evans in view of Cosman as applied to claims 2 and 21 above, and further in view of Beetz, Jr., et al (US 6045677). Evans in view of Cosman, as discussed above,

Substantially discloses the invention as claimed, however fails to explicitly disclose the properties of the cameras used. However, a variety of cameras are known in the imaging art. For example, a microchannel plate is well known in the art for used in imaging apparatus (Col. 4, line 40) such as a variety of physical science instrumentation, streak cameras as they have immunity to magnetic fields (Col. 2, line 51). Therefore, such a camera would function in a magnetic resonance scanner with field strength of more than 100 Gauss without loss of accuracy. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosures of Evans and Cosman in light of the teachings in the reference by Beetz, as it would be obviously necessary to use a camera that can withstand the field strength of an MRI if the camera system is to be used in an MRI, as disclosed by Cosman.

4. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Evans in view of Cosman as applied to claim 5 above, and further in view of Schmitz (US 6050724). Evans in view of Cosman, as discussed above, substantially disclose the

invention as claimed, however fail to disclose the configuration of the two cameras in relation to the imaging system. Schmitz also discloses a system using two cameras and an imaging device for position detection and further discloses that the two infrared CCD cameras are mounted to the side of the imaging system (Col. 5, lines 32-33) as shown in figure 1. The axis of the imaging system runs directly through the center of the imaging system, therefore creating a 45-degree angle between each camera and the axis of the scanner. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Evans in view of Cosman in light of the teachings in the reference by Schmitz, as mounting the cameras on the imaging system itself advantageously eliminates one calibration or registration step, as the two systems are rigidly registered to each other.

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Evans in view of Cosman as applied to claim 1 above, and further in view of Nakagawa, et al (US 2002/0122117). Evans in view of Cosman, as discussed above, substantially discloses the invention as claimed, however fails to explicitly disclose the accuracy of the cameras used. A variety of cameras are well known in the imaging art, such as the one disclosed by Nakagawa. Nakagawa discloses a camera device for imaging which is capable of being used for accurate measurement. The CCD is capable of accuracy within 0.1mm or less (paragraph 109). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosures of Evans and Cosman in light of the reference by Nakagawa, as it would be an obvious advantage to use a high accuracy camera, as Nakagawa states for measurement, for use in a medical or

surgical system as the measurements and positioning obtained is critical to the health of the patient.

6. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Evans in view of Cosman as applied to claim 14 above, and further in view of Ward, et al ("Prospective Multiaxial Motion Correction for fMRI", Magnetic Resonance in Medicine, 2000). Evans in view of Cosman, as discussed above, substantially discloses the invention as claimed, however fails to disclose testing motion correction algorithms. Ward discloses a system for motion correction in an imaging system wherein testing of the system and the motion correction algorithms used is done using computerized motion phantoms. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosures of Evans and Cosman in light of the teachings in the reference by Ward to include testing motion correction algorithms, as Ward states that motion is a known problem in MRI images and testing algorithms allow for improved motion correction of the images.


### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joel M. Lamprecht whose telephone number is (571) 272-3250. The examiner can normally be reached on Monday-Friday 7:30AM-4PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian L. Casler can be reached on (571)272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 3737

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
BRIAN L. CASLER  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 3737